PLAGUE

Plague, is caused by bacteria called *Yersinia pestis*. Onset of plague is usually 2 to 6 days after a person is exposed. Initial symptoms include fever, headache, and general illness, followed by the development of painful, swollen regional lymph nodes. The disease progresses rapidly and the bacteria can invade the bloodstream, producing severe illness, called plague septicemia. Once a human is infected, a progressive illness generally results unless specific antibiotic therapy is given. Progression leads to blood infection and, finally, to lung infection. The infection of the lung is termed *plague pneumonia*, and it can be transmitted to others through the expulsion of droplets by coughing. The incubation period of primary pneumonic plague is 1 to 3 days and is characterized by development of an overwhelming pneumonia with high fever, cough, bloody sputum, and chills. For plague pneumonia patients, the death rate is over 50%.

Geographic Distribution of Plague

In the United States, most of the human plague cases occur in two regions:

- Northern New Mexico, northern Arizona, and southern Colorado.
- California, southern Oregon, and far western Nevada.

How Is Plague Transmitted?

Plague is transmitted from animal to animal and from animal to human by the bites of infective fleas. Less frequently, the organism enters through a break in the skin by direct contact with tissue or body fluids of a plague-infected animal, for instance, in the process of skinning a rabbit or other infected animal. Plague is also transmitted by inhaling infected droplets expelled by coughing, by a person or animal, especially domestic cats, with pneumonic plague. Transmission of plague from person to person is uncommon and has not been observed in the United States since 1924 but does occur as an important factor in plague epidemics in some developing countries.

Human plague cases in the U.S. have been sporadic cases acquired from wild rodents or their fleas. Rock squirrels and their fleas are the most frequent sources of human infection in the southwestern states. For the Pacific states, the California ground squirrel and its fleas are the most common source. Many other rodent species, for instance, prairie dogs, wood rats, chipmunks, and other ground squirrels and their fleas, suffer plague outbreaks and some of these occasionally serve as sources of human infection. Deer mice and voles are thought to maintain the disease in animal populations but are less important as sources of human infection. Other less frequent sources of infection include wild rabbits, wild carnivores, and even antelopes, which pick up their infections from wild rodent outbreaks. Domestic cats (and sometimes dogs) are readily infected by fleas or from eating infected wild rodents. Cats may serve as a source of infection to persons exposed to them. Pets may also bring plague-infected fleas into the home. Between outbreaks, the plague bacterium is believed to circulate within populations of certain species of rodents without causing excessive mortality. Such groups of infected animals serve as silent, long-term reservoirs of infection.

Prevention

Plague will probably continue to exist in its many localized geographic areas in the southwest since attempts to eliminate wild rodent plague are impractical and futile. Therefore, primary preventive measures are directed toward reducing the threat of infection in humans in high risk areas through four techniques:

- Environmental management
- Public health education
- Preventive drug therapy
- Vaccines.

Environmental Management

- Preventing epidemic plague requires the reducing or eliminating house rat populations in both urban and rural areas. Control of plague in such situations requires two things: Close surveillance for human plague cases, and for plague in rodents.
- Use of an effective insecticide to control rodent fleas when human plague cases and rodent outbreaks occur.

Public Health Education

In regions such as the American West where plague is widespread in wild rodents, the greatest threat is to people living, working, or playing in areas where the infection is active. Public health education of citizens and the medical community should include information on the following plague prevention measures:

- Eliminating of food and shelter for rodents around homes, work places, and recreation areas by removing brush, rock piles, junk, and food sources (such as pet food), from the site.

- Surveillance for plague activity in rodent populations in and surrounding high risk areas by public health workers or by citizens reporting rodents found sick or dead to local health departments.
- Use of appropriate and licensed insecticides to kill fleas during wild animal plague outbreaks to reduce the risk to humans.
- Treatment of pets (dogs and cats) for flea control once each week.

Preventive Drug Therapy

Antibiotics may be taken in the event of exposure to the bites of wild rodent fleas during an outbreak or to the tissues or fluids of a plague-infected animal. Preventive therapy is also recommended in the event of close exposure to another person or to a pet animal with suspected plague pneumonia. For preventive drug therapy, the preferred antibiotics are the tetracyclines, chloramphenicol, or one of the effective sulfonamides.

Vaccines

Plague vaccine is available and should be considered for the following high risk groups:
- Persons working with the plague bacterium in the laboratory or in the field.
- Persons working in plague-affected areas or with potentially infected animals where they have little control over their environments, particularly in developing countries.

REFERENCES

Health Information, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Department of Health and Human Services

If you have any questions, please contact your Regional Public Health Consultant or park sanitarian, or call WASO Public Health for more information at **202-565-1120** or see our NPS Public Health web page at **www.nps.gov/public_health/**.

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